Health Consultation

Results of November 18,1999, Exposure Investigation

MATTHIESSEN AND HEGELER ZINC COMPANY

LA SALLE, LA SALLE COUNTY, ILLINOIS

EPA FACILITY ID: IL0000064782

MARCH 21, 2001

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

You May Contact ATSDR TOLL FREE at
1-888-42ATSDR
or
Visit our Home Page at: http://atsdr1.atsdr.cdc.gov:8080/

HEALTH CONSULTATION

Results of November 18,1999, Exposure Investigation

MATTHIESSEN AND HEGELER ZINC COMPANY

LA SALLE, LA SALLE COUNTY, ILLINOIS

EPA FACILITY ID: IL0000064782

Prepared by:

Illinois Department of Public Health
Under Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

Purpose and Statement of Issues

On September 30, 1999, the Agency for Toxic Substances and Disease Registry (ATSDR) in cooperation with the Illinois Department of Public Health (IDPH) issued a public health assessment for Matthiessen and Hegeler Zinc Company (MHZ) hazardous waste site [1]. IDPH concluded that the site was a public health hazard. Several site-related inorganic chemicals appeared to be present in an adjacent residential area, and IDPH recommended additional surface soil sampling of this area.

Staff from IDPH collected soil samples from the yards of houses near the site on November 18, 1999, as part of an exposure investigation. The results of the sampling are discussed in this document.

Background

Site History

The MHZ site is on the east side of La Salle in La Salle County, Illinois, and is about 120 acres in size (Attachment 1). The site is bordered by the Little Vermilion River to the north and east, the Carus Chemical Company to the south, and the La Salle Rolling Mills Company and Sterling and Zinc Streets to the west. Private homes are along the western and southern site boundaries.

MHZ was founded in 1858 as a zinc smelter using locally-mined coal for fuel. The rolling mill was constructed in 1866. A hybrid furnace using steam and coke as fuel increased the efficiency of the roasting and smelting operation. The process generated sulfur dioxide that was recovered and converted to sulfuric acid. The acid was stored on the site in several large tanks and sold as by-product. Some of the generated sulfuric acid was used by an ammonium sulfate fertilizer plant that operated at the site for several years in the 1950s.

MHZ stopped mining coal at the site in 1937 and stopped zinc smelting in 1961. In 1968, sulfuric acid manufacturing ended. The rolling operations continued until the plant closed in 1978 after the company declared bankruptcy. Most of the buildings formerly used by MHZ, including the smelter, roasters, acid works, tanks, fertilizer plant, coal mine, and support structures, have been completely or partially demolished.

Currently, the site is completely fenced along its south, west, and north boundaries. The nearest private homes are adjacent to the site on the west and south. Several small parks are also near the site to the west. A school is about 800 feet west of the site. Approximately 1,500 people reside within a quarter mile west and south of the site.

Residential Soil Sampling

On November 18, 1999, IDPH staff collected composite soil samples from the front and back yards of 17 homes in the immediate vicinity of the site and collected two background soil

samples (Attachment 2). Background sample S1 was collected from Hegeler Park about 1 mile west of the site, and background sample S2 was collected from a farm field approximately 4 miles northwest of the site. Soil samples were collected randomly, each composed of a mixture of nine grab samples taken over a 1 square foot area from a depth of 0.5 to 1 inch. The residential yards exhibited good grass cover. Grass was removed from the soil samples. Appropriate decontamination and handling procedures were applied to all samples. The samples were analyzed for 6 metals: arsenic, cadmium, chromium, lead, manganese, and zinc.

Discussion

Chemicals of Interest

In preparing this health consultation, IDPH assumed that adequate quality assurance and quality control measures were followed during the laboratory analysis and data reporting. IDPH compared the concentration of each contaminant (Table 1) with appropriate comparison values developed by ATSDR and other sources to select chemicals for further evaluation [2,3]. A detailed discussion of each of the comparison values used is presented in Attachment 3. Metals exceeding comparison values were further evaluated, considering exposure to children and adults. All six metals tested were present at levels greater than those found in background samples, but only cadmium and lead were found at levels greater than comparison values (Table 2) [4,5].

Exposure Scenarios

The potential for persons to experience adverse health effects from exposure to a chemical depends on the age of the person when exposure occurs, how much of it a person contacts, how long the exposure lasts, and the health condition of the person exposed. IDPH considered an exposure scenario of a child playing in the yard 5 days a week for 9 months every year until the age of 16 and for an adult contacting soil while working in the yard over a 30-year period. Where more than one sample was taken from a yard, IDPH averaged the laboratory results to estimate exposure to contaminants because the average was more likely to represent actual exposure. The yards in this neighborhood were well-kept. Because the ground is covered with grass during the season when children typically play in the yard, IDPH believes the amount of contaminated soil and dust available for ingestion is further reduced.

Children are more susceptible to chemicals because some of their developing systems are more vulnerable, and because they consume more food, drink more water, and breathe more air than adults do on a per weight basis. They also spend much more time at ground level and explore their environment with their hands and mouths, so they can readily contact and ingest chemicals in surface soil.

Cadmium

The sample with the highest level of cadmium (117 ppm) is more than one hundred times greater than background (1.3 ppm). The average level of cadmium in the residential area sampled was about 30 ppm. This area clearly has elevated levels of cadmium in the surface soils, but based on the scenarios described, exposure to the levels of cadmium detected in soil are not expected to cause adverse health effects.

Lead

Children who live and play in an area with elevated soil lead levels can have increased exposure. Exposure to lead poses a health hazard, particularly to children and the fetus. The IDPH Lead Poisoning Prevention Code, as amended on February 1, 1993, has established a guideline of 1,000 parts per million (ppm) of lead for residential soil [3]. At levels greater than 1,000 ppm of lead in soil, exposure might increase lead uptake into the body if persons routinely play or work in this soil. The highest level of lead detected during the November 1999 sampling was 1,005 ppm in the back yard of a home across the street from the site. That was the only sample of the 34 samples collected that exceeded the IDPH guideline of 1,000 ppm[1]. The next highest sample contained 878 ppm lead, and most samples contained less than 500 ppm.

On the basis of the samples and the exposure scenarios previously described, IDPH does not believe that exposure to lead in residential surface soil poses a health hazard. However, the mechanisms for how people take lead into their bodies from environmental sources is not well understood. Because long-term exposure to lead has been shown to affect virtually every organ and system in the human body and because children are the most sensitive population to lead exposure, residents might consider further reducing their exposure to lead in surface soil.

Lead can affect almost every organ system in the body. The central nervous system is most sensitive to lead, particularly in children. Children exposed to elevated levels of lead may show decreased IQ scores. Lead can also damage the kidneys and the reproductive system. The connection between these effects and exposure to low levels of lead is not clear.

Child Health Considerations

IDPH recognizes that children in the neighborhood with elevated levels of metals in their yards are potentially a sensitive population at this site. Exposure to lead is more dangerous for young and unborn children. The developing central nervous systems of children are particularly sensitive to lead. Children exposed to elevated levels of lead may show decreased IQ scores. Unborn children can be exposed to lead through their mothers. Although the harmful effects of high-level lead exposure are well documented, the effects of low-level lead exposure are less

---

[1]The U.S. Environmental Protection Agency often uses 400 ppm as a clean-up level for lead in residential settings. The Illinois Lead Poisoning Program uses 1,000 ppm, which is based on at least one Illinois study, as the guideline for lead levels in residential yards for initiating further actions.

less clear. Parents concerned about their children's lead exposure should have their children's blood tested for lead at their local physician's office or local health department.

Public Notification

In January 2000, IDPH mailed a personal assessment of the sample results to each home involved in the November 1999 sampling. Each letter also included a fact sheet providing information about how to reduce exposure to contaminants in soil.

Conclusions

On the basis of the November 1999 soil sampling results, IDPH concludes that under current conditions exposure to contaminated soils in residential areas adjacent to the MHZ site are not at levels expected to cause adverse health effects.Because of the lack of air monitoring data, the air pathway poses an indeterminant public health hazard. IDPH classifies the exposure to residential soil near the site as no apparent public health hazard. Since the health effects of low-level lead exposure are not well understood, parents of children whose yards contained higher levels of lead may wish to have their children's blood lead level evaluated at their local physician's office or local health department.

Recommendations and Public Health Action Plan

IDPH has provided a personal assessment of the sample results and fact sheet on how to reduce exposure (e.g., wash hands before eating or drinking, maintain good vegitative cover, etc.) to contaminants in soil to each home involved in the November 1999 sampling. As IEPA continues to evaluate the MHZ site, more environmental data might be generated. IDPH will review additional information and data as they become available and answer any future community questions related to the MHZ site.

PREPARER OF REPORT

Constanta E. Mosoiu
Environmental Toxicologist
Illinois Department of Public Health

REFERENCES

1. Agency for Toxic Substances and Disease Registry. Public health assessment for Matthiessen and Hegeler Zinc Company, La Salle, La Salle County, Illinois. Atlanta:U.S. Department of Health and Human Services; September 30, 1999.

2. Agency for Toxic Substances and Disease Registry. Soil Comparison Values (Expires 3/31/00).

3. Illinois Department of Public Health. Lead Poisoning Prevention Code as amended February 1, 1993.

4. Agency for Toxic Substances and Disease Registry. Toxicological profile for cadmium (update). Atlanta: US Department of Health and Human Services; July 1999.

5. Agency for Toxic Substances and Disease Registry. Toxicological profile for lead (update). Atlanta: US Department of Health and Human Services; July 1999.

Certification

This Mathiessen and Hegeler Zinc Company Health Consultation was prepared by the Illinois Department of Public Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the health consultation was begun.

for Gail D. Godfrey
Technical Project Officer
Superfund Site Assessment Branch (SSAB)
Division of Health Assessment and Consultation (DHAC)
ATSDR

The Division of Health Assessment and Consultation, ATSDR, has reviewed this health consultation and concurs with its findings.

Richard E. Gillig
Chief, SPS, SSAB, DHAC, ATSDR

Table 1. **Complete soil sampling results from residential yards and background samples. Collected by IDPH on Nov. 18, 1999.**

Location	Arsenic (ppm)		Cadmium (ppm)		Chromium (ppm)		Lead (ppm)		Manganese (ppm)		Zinc (ppm)	
	Front	Back	Front	Back	Front	Back	Front	Back	Front	Back	Front	Back
H1	7.3	5.8	37.8	13.9	23.3	24.8	373	177	819	626	4742	1952
H2	7.8	11.8	52	87.3	195	22.3	492	361.4	876	777	5870	8850
H3	10.6	4.5	34.6	22.4	34.3	21.1	614	219	782	703	425	3215
H4	7.8	8.3	26.7	10.2	22.5	21.2	224	102	799	606	3355	1413
H5	<2.1	8.1	1.6	12.2	26.1	23.3	23.4	164	491	936	223	1564
H6	2.2	6.1	16.6	23.1	27	31	203	143	614	828	2120	2690
H7	2.5	6.1	24.1	28.1	24.5	20.7	196	146	685	738	3080	3230
H8	8.3	8.1	51.6	18.3	27.2	25.7	349	273	798	560	6062	2475
H9	5.6	9.8	19.9	21.2	23.3	28.9	461	309	527	793	2708	2246
H10	9.3	12.7	29.6	37.1	24.6	33.7	229	1005	668	906	3902	4877
H11	5.1	8.6	42.8	41.2	25.9	21.8	318	278	798	750	5691	5604
H12	7.7	7.9	26.9	14.1	30	24.2	221	196	709	680	3414	2163
H13	15.7	16.7	23.6	117	70.2	25	878	720	1043	1090	9699	17467
H14	<2.1	6.4	1.1	10.2	24.8	26.5	17.6	111	432	882	178	1400
H15	<2.1	3.2	4.6	15.9	21.4	27.7	89.9	170	546	601	792	2193
H16	7.9	7.5	60	33	31.1	28	553	301	740	626	6770	4960
H17	6.3	6.9	28.3	41.7	27.7	25.3	410	431	996	704	3290	4130
Background 1	<2.1		1.3		25.7		17.2		408		160	
Background 2	<2.1		1.2		23.2		24.4		338		261	
Illinois Metropolitan	7.4 mean 7.2 median		1.3 mean 0.6 median		21.2 mean 16.2 median		71.1 mean 36 median		742 mean 636 median		137.9 mean 95 median	
Comparison Values*	20 EMEG		10 EMEG		hexavalent: 200 RMEG		1000**		3000 RMEG		20,000 EMEG	

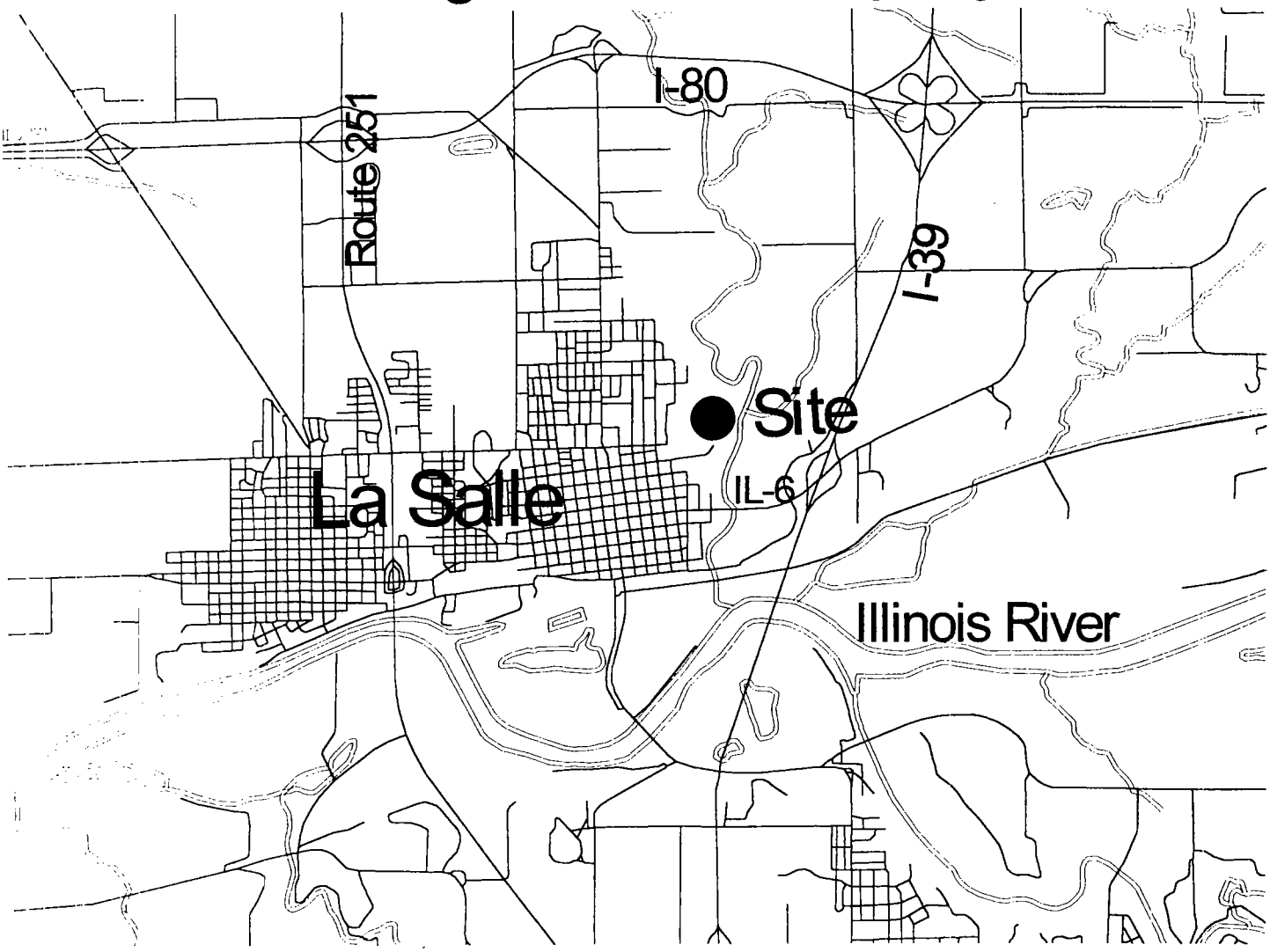
*ATSDR. Soil comparison values for chronic exposure of a child **The IDPH Lead Poisoning Prevention Code as amended February 1, 1993

Table 2. Soil contaminants exceeding comparison values in residential front and back yards and background sample results. Collected by IDPH on Nov. 18, 1999.

Sample ID	Cadmium (ppm)		Lead (ppm)	
	Front Yard	Back Yard	Front Yard	Back Yard
H1	37.8	13.9	lcv	lcv
H2	52	87.3	lcv	lcv
H3	34.6	22.4	lcv	lcv
H4	26.7	10.2	lcv	lcv
H5	lcv	12.2	lcv	lcv
H6	16.6	23.1	lcv	lcv
H7	24.1	28.1	lcv	lcv
H8	51.6	18.3	lcv	lcv
H9	19.9	21.2	lcv	lcv
H10	29.6	37.1	lcv	1,005
H11	42.8	41.2	lcv	lcv
H12	26.9	14.1	lcv	lcv
H13	23.6	117	lcv	lcv
H14	lcv	10.2	lcv	lcv
H15	lcv	15.9	lcv	lcv
H16	60	33	lcv	lcv
H17	28.3	41.7	lcv	lcv
Background S1	1.3		17.2	
Background S2	1.2		24.4	
Comparison values	10* EMEG		1000**	

ppm = parts per million = milligrams of contaminant per kilogram of soil
NS = no sample collected lcv = less than comparison value
*ATSDR. Soil comparison values for chronic exposure of a child
**IDPH Lead Poisoning Prevention Code as amended February 1, 1993
EMEG = Environmental Media Evaluation Guides (Attachment 3)

Approximate Location of Matthiessen and Hegeler Zinc Company

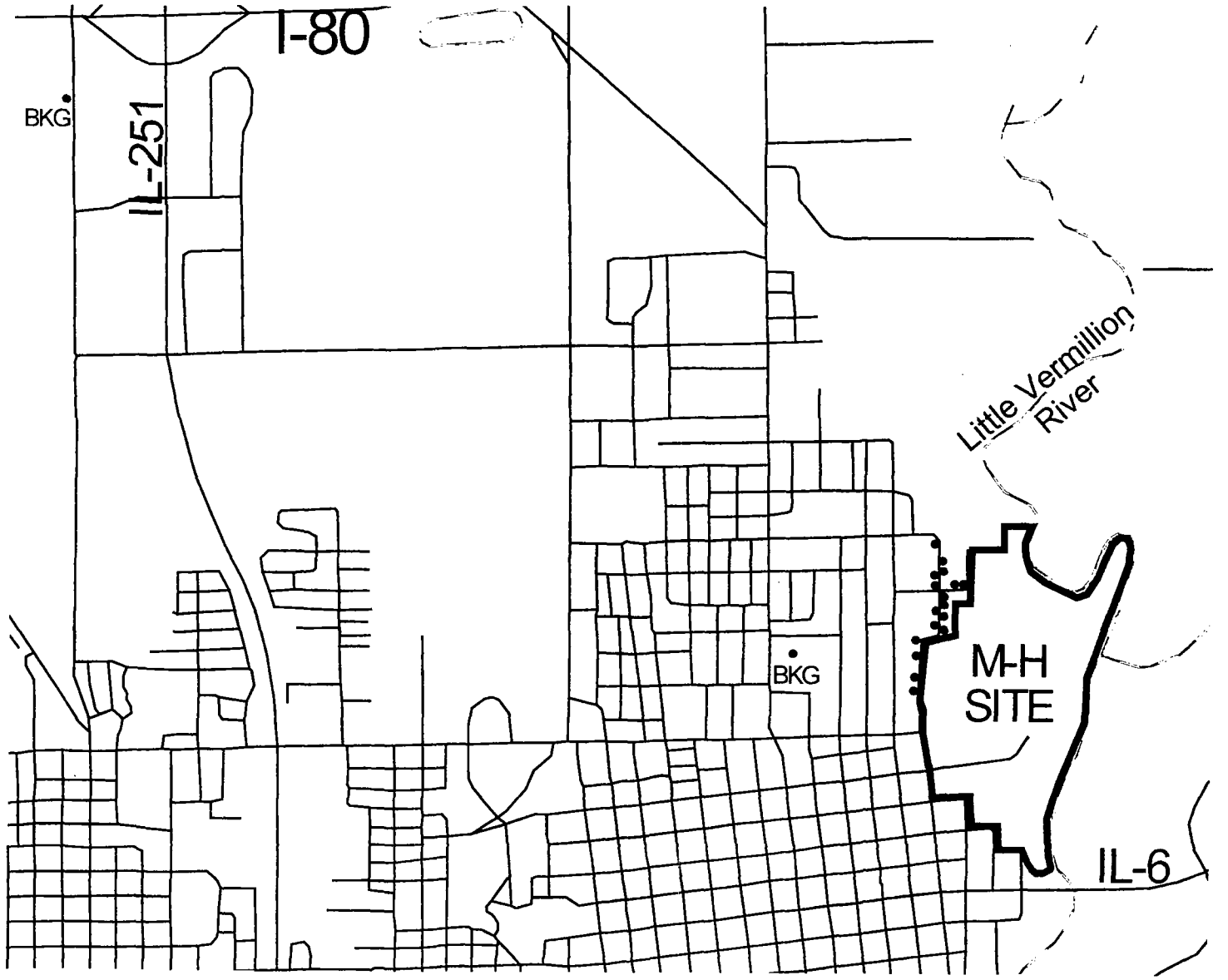


Surface Water
Roads

N
W E
S

Source: IDPH GIS

November 18, 1999 Surface Soil Sample Locations



Surface Water

Roads

• Sample Location

N
W
E
S

Source: IDPH GIS

Comparison values used in screening contaminants for further evaluation

Environmental Media Evaluation Guides (EMEGs) are developed for chemicals based on their toxicity, frequency of occurrence at National Priorities List (NPL) sites, and potential for human exposure. They are derived to protect the most sensitive populations, are not clean-up levels, but rather comparison values to use when selecting a contaminant to evaluate exposures. They are developed without consideration for carcinogenic effects, chemical interactions, multiple route exposure or other media-specific routes of exposures, and are very conservative concentrations designed to consider sensitive members of the population.

Reference Dose Media Evaluation Guides (RMEGs) are another type of comparison value derived to consider the most sensitive populations. They are developed without consideration for carcinogenic effects, chemical interactions, multiple route exposure or other media-specific routes of exposure, and are very conservative concentrations.

Cancer Risk Evaluation Guides (CREGs) are estimated contaminant concentrations based on a one excess cancer in a million persons exposed to a chemical over a lifetime. They are very conservative values designed to consider sensitive members of the population.